32692
Customer Number

Patent
Case No.: 59001US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	WOLK, MARTIN B.		
Application No.:	10/731199	Group Art Unit:	1752
Filed:	December 9, 2003	Examiner:	Richard L. Schilling
Title:	THERMAL TRANSFER OF LIGHT-EMITTING DENDRIMERS		

AFFIDAVIT UNDER 37 C.F.R. 1.131

STATE OF MINNESOTA)
)
COUNTY OF RAMSEY)

I, Martin B. Wolk, being duly sworn, does hereby depose and say as follows:

1. I am the Applicant of the above-identified patent application and the sole inventor of the subject matter described and claimed therein.

2. Prior to February 27, 2003, I completed the invention as described and claimed in the above-identified application in this country, the Untied States of America, as evidenced by the following:

a. Prior to February 27, 2003, I made, or at my direction had made, a device as described in Claim 1 of U.S. Patent Application Attorney Docket No. 59001US007 (Serial No. 11/074268, filed March 7, 2005) by following the steps of the method described in Claim 1 of U.S. Patent Application Attorney Docket No. 59001US002 (Serial No. 10/731199, filed December 9 2003). Evidence of the device and method used to make the device can be found in pages 58-62 of my Lab Notebook No. 129169, a copy of which is attached as Exhibit A.

b. From pages 58-62 of my Lab Notebook No. 129169, it can be seen that several devices were made by using a laser induced thermal imaging (LITI) processes to transfer, from donors to receptors, portions of various formulations of transfer layers including dendrimers.

3. Each of the dates deleted from Exhibit A is prior to February 27, 2003.

4. I acknowledge that willful false statements and the like are punishable by fine or imprisonment, or both, (18 U.S.C. § 1001) and may jeopardize the validity of the application or any patent issuing thereon. All statements made in this Affidavit of my own knowledge are true and all statements made on information and belief are believed to be true.

FURTHER AFFIANT SAYETH NOT.

Martin B. Wolk

Sworn to and subscribed before me by the above-named Applicant,
this 9th day of February, 2006.

Notary Public seal

JO A. E. BORCHERS
Notary Public
Minnesota
My Commission Expires January 31, 2007

NOTEBOOK NO. 129169 58

1 PROJECT NO. SUBJECT: DATE:

Objective:

PROJECT NO. 0022998005 LITI OLED PRINTED
NOTEBOOK NO. 129169 3M CONFIDENTIAL

5 Reference:

Dendrimers versus "Soluble Triplet Emitters"

Purpose: This experiment involved reproducing the high efficiency devices that were prepared during the Opsys visit of In addition, we compared our current best molecular film formulation with the formulation used in September.

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Description: The experiment compared the performance of conventional and LITI devices using Covion Ir(ppy)$_3$-SC4 (Covion ID# IDB 3009) and Opsys Ir(ppy)$_3$-D (Opsys ID# HSA 35) at equimolar concentrations. The molecular weight of the Covion material is 967.3 g/mol and the molecular weight of the dendrimer (from published Opsys data) is 2108.9 g/mol.

All solution preparation and coating will be done in the glovebox. Imaging will be done by briefly removing the substrates from the box and returning them to the box until cathode deposition is scheduled.

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The experiment parameters are as follows:

Emitter Type 1: Covion Ir(ppy)$_3$-SC4 (Covion ID# IDB 3009)
Emitter Type 2: Opsys Ir(ppy)$_3$-D (Opsys ID# HSA 35)

Formulation Type 1: spiro-CBP-S1:emitter 80:20 (w/w, dendrimer), 90.8:9.2 (w/w, Covion)
Formulation Type 2: EL028T/spiro-CF$_3$PBD/EM 45:45:10 (w/w/w, Covion), 39.1:39.1:21.8 (w/w/w, dendrimer)

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ITO Coating Type 1: SiO_2
ITO Coating Type 2: EL111T (160 nm)

Device Type 1: spin coated conventional (SiO_2 buffer only)
Device Type 2: LITI device

Cathode: TPBI/LIF/Al/Ag (500/10/40/4000 Å)

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Experiment Samples:

Tables 1 and 2 indicate the device types generated in this experiment. In addition, a series of dosing experiments were carried out in order to prepare the LITI devices. Dosing slides were prepared for each device type in Table 2.

Table 1: Spin Coated Device Types (in triplicate)

Emitter	Formulation	ITO Coating
1 (Covion)	1	SiO_2
2 (Opsys)	1	SiO_2
1 (Covion)	2	SiO_2
2 (Opsys)	2	SiO_2

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AUTHOR'S INITIALS		DATE
WITNESS'S INITIALS		DATE 3/5/03

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 129169 NOTEBOOK NO. 59

1 PROJECT NO. SUBJECT: DATE:

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PROJECT NO. 0022998005 LITI OLED PRINTED
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5 Reference:

Table 2: LITI Device Types (In triplicate)

Emitter	Formulation	LTC Coating
1 (Covion)	1	SiO_2
1 (Covion)	1	EL111T
2 (Opsys)	1	SiO_2
2 (Opsys)	1	EL111T
1 (Covion)	2	SiO_2
1 (Covion)	2	EL111T
2 (Opsys)	2	SiO_2
2 (Opsys)	2	EL111T

Summary of 021203 Averaged Coupon Data
(@ 400 Cd/m^2)

Sample ID	Construction	Anneal	Voltage (Volts)	Current Density (mA/cm^2)	Efficiency (Cd/A)	Lead Pixels	Lifetime (40hrs) (Hours)
021203-01	MF/Covion	Conv	5.13	1.68	24.0	1	
021203-02	MF/Covion	"	6.26	2.48	16.2	3	
021203-04	MF/Opsys	"	4.81	1.36	29.3	2	
021203-05	MF/Opsys	"	5.20	1.68	24.0	3	
021203-07	sCBP/Covion	"	6.89	2.32	17.3	3	
021203-08	sCBP/Covion	"	6.73	2.16	18.5	3	
021203-09	sCBP/Covion	"	7.12	2.59	15.5	3	
021203-10	sCBP/Opsys	"	6.70	1.71	23.9	2	
021203-11	sCBP/Opsys	"	6.46	1.28	32.5	3	
021203-12	sCBP/Opsys	"	5.97	1.20	34.2	3	
021203-32	MF/Covion	LITI	4.95	1.06	37.7	3	44
021203-33	MF/Covion	"	4.91	1.05	38.1	1	
021203-34	MF/Covion	"	5.26	1.11	36.1	2	
021203-38	MF/Opsys	"	5.18	1.17	34.3	3	26
021203-39	MF/Opsys	"	5.31	1.16	34.7	3	36
021203-40	MF/Opsys	"	5.53	1.18	33.9	1	
021203-41	MF/Opsys	"	5.26	1.16	34.5	3	31
021203-44	sCBP/Covion	"	5.40	1.01	39.9	4	12
021203-45	sCBP/Covion	"	6.56	1.48	27.2	2	
021203-46	sCBP/Covion	"	5.75	1.20	33.6	3	
021203-50	sCBP/Opsys	"	10.54	1.42	28.2	1	
021203-51	sCBP/Opsys	"	5.62	1.37	29.3	2	
021203-52	sCBP/Opsys	"	5.79	1.27	31.5	3	
021203-63	MF/Covion	"	5.99	1.56	25.6	2	
021203-66	sCBP/Opsys	"	7.45	1.51	26.5	3	5
021203-68	sCBP/Covion	"	6.76	1.76	22.7	1	
021203-69	sCBP/Covion	"	7.87	1.65	24.3	2	
021203-70	sCBP/Opsys	"	7.33	1.43	28.0	2	

AUTHOR'S INITIALS MBR	DATE
WITNESS'S INITIALS JBrei	DATE 5/5/03

AUTHOR'S FULL NAME or INITIALS MBR DATE:

WITNESS'S FULL NAME or INITIALS JBrei DATE: 5/5/03
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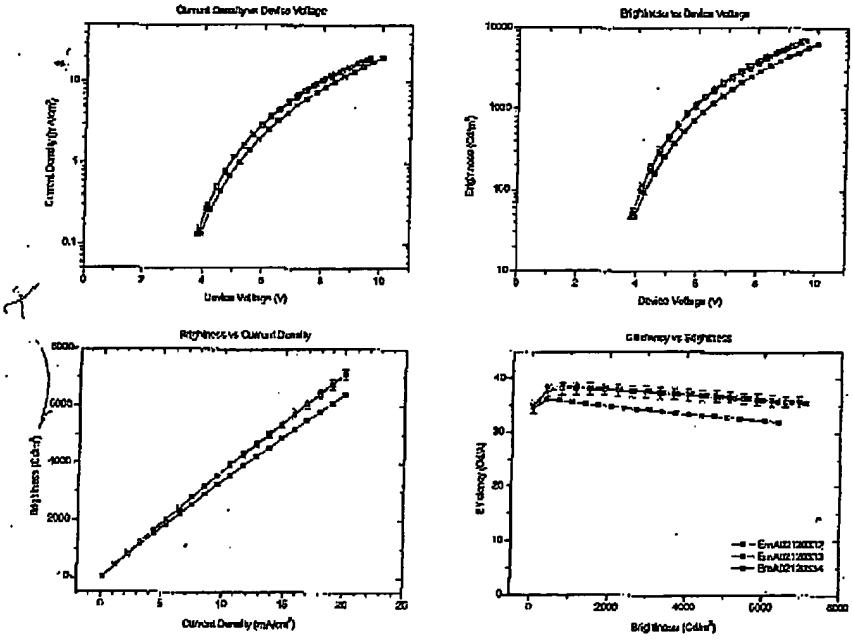
PROJECT NO. 0022998005 LITI OLED PRINTED
NOTEBOOK NO. 129169 3M CONFIDENTIAL

Summary of 021203 Averaged Data by Device Type
(@ 400 Cd/m^2)

Construction	Type	Volts	mA/cm^2	Cd/A	Pixels
MF/Covion	conv	5.70	2.08	20.14	4.00
MF/Covion	LITI	5.28	1.19	34.38	8.00
MF/Opsys	conv	5.00	1.52	26.67	5.00
MF/Opsys	LITI	5.32	1.17	34.33	10.00
sCBP/Covion	conv	6.91	2.36	17.12	9.00
sCBP/Covion	LITI	6.47	1.42	29.55	12.00
sCBP/Opsys	conv	6.38	1.40	30.18	8.00
sCBP/Opsys	LITI	7.34	1.40	28.70	11.00

LIV Data Plots for Three Samples

Averaged Data (MDF/Covion/TPBI)



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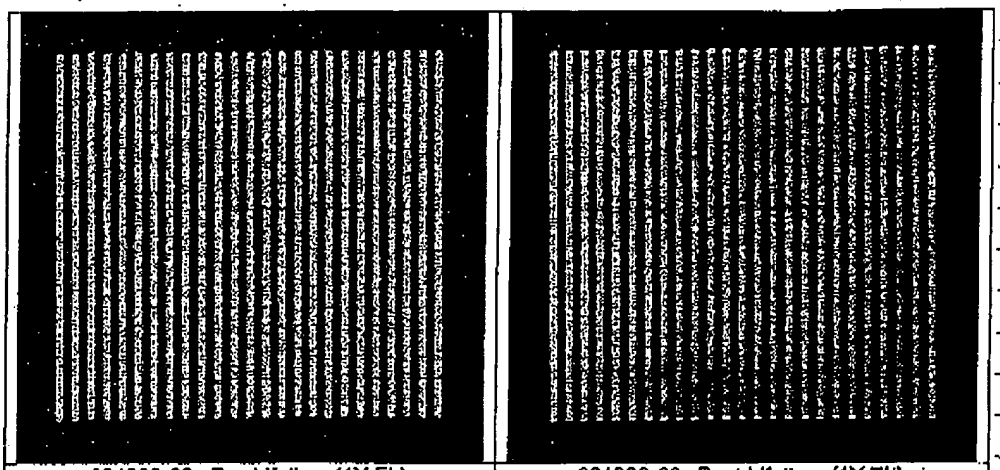
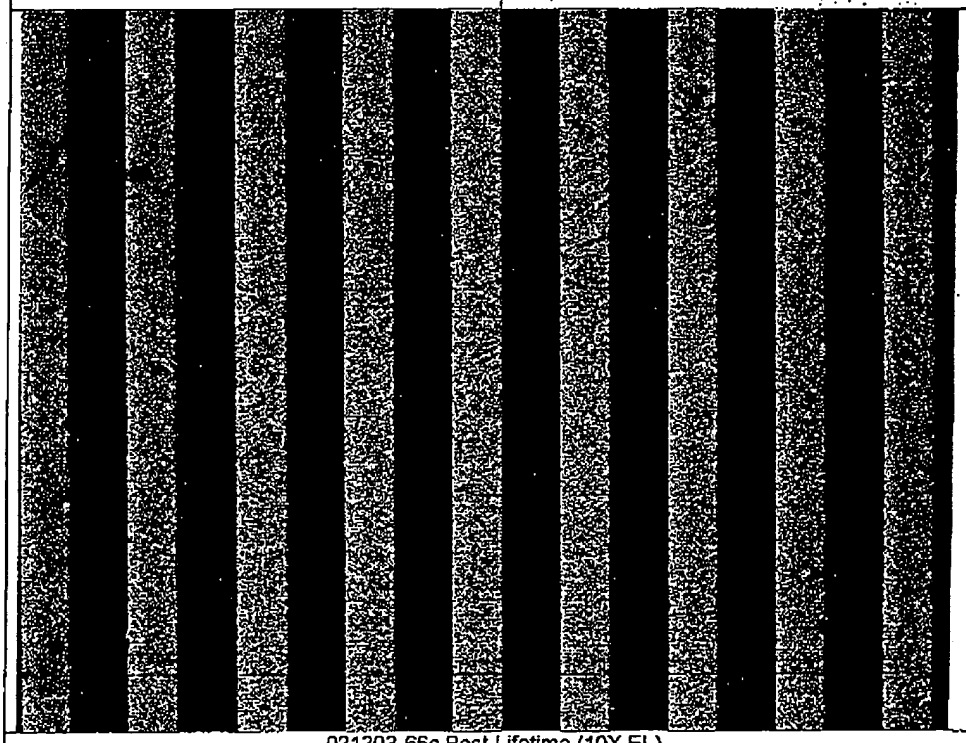
5 Reference:



021203-66c Pre-Lifetime (1X EL) 021203-66c Post-Lifetime (1X EL)



021203-66c Post-Lifetime (10X EL)

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Comments and Conclusions:

We successfully reproduced the results of September by preparing high efficiency devices based on the Opsys dendrimer. We also prepared LITI devices of equal quality. Furthermore, we demonstrated that devices with similar, if not identical, performance could be prepared with the Covion soluble emitter.

The lifetime results were poor. All devices failed within 70 hours at 400 cd/m^2. FL micrographs were examined before and after the lifetime experiment. No gross defects were found – just an overall dimming and a very slight mottling.

The portion of the experiment dealing with the HB layer (TPBI versus BAlq) was omitted due to problems during the BAlq cathode runs. The effect of TPBI on lifetime is unknown at this point.

Future experiments will concentrate on improving lifetime of these high efficiency devices.

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John Baetzold
Khanh Huynh
Leslie Kreilich

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